

REMARKS

Claims 1, 2, 4, 6, 7, 9, 12-19, 21-24, 26, 29-32 and 37-42 are pending in the present application. Claims 37-42 are newly added. No new matter has been presented.

Support for new claims 37-42 is in the specification at, *e.g.*, page 6.

Claim Rejections – 35 U.S.C. § 103

Claims 1, 2, 9, 4, 14-17, 19, 21, 26, 31 and 32 were rejected under 35 U.S.C. § 103(a) as being unpatentable over **Zubarev** (US 6,958,472) in view of **Ding** (US 7,193,207); claims 5, 19, 21, 22, 26 and 36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over **Zubarev** in view of **Berkout** (US 6,858,840) and further in view of **Ding**; claims 6, 7 and 18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over **Zubarev** in view of **Ding** and further in view of **Zubarev '851** (US 6,800,851); claims 12, 13, 29 and 30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over **Zubarev** in view of **Ding** and further in view of **Reinhold** (US 6,483,109); and claims 23 and 24 are rejected under 35 U.S.C. § 103(a) as being unpatentable over **Zubarev** in view of **Berkout**, further in view of **Ding**, and further in view of **Zubarev '851**.

Favorable reconsideration is requested.

An object of the present invention is to resolve the difficulty in injecting electrons, while keeping their kinetic energy low, into an ion trap for Electron Captured Dissociation (ECD). Claims 1 and 9 have a feature of switching the trapping voltage between two discrete DC voltages to form the rectangular waveform in which the peak-to-peak value is constant (see Fig. 2), and injecting electrons during the period of voltage V2. The hole of the endcap electrode is

the place where electrons are injected into the ion trap. Claims 19 and 26 recite a 3-D quadrupole ion trap including switch means and control means for performing the noted function.

Zubarev describes an invention concerning ECD in an ion trap as the second embodiment. The second embodiment in Zubarev injects electrons via the hole of the endcap electrode 22 into the iontrap. Zubarev controls the trapping voltage depending on the respective periods of the whole process of ECD to change the peak-to-peak value of the trapping voltage. (Col. 10.) Electrons are injected while the peak-to-peak value of the trapping voltages is reduced to 3V. (Col. 10, lines 2-4.)

Ding proposes a different method of applying a rectangular waveform to the quadrupole mass spectrometer. This means that the basic apparatus in Ding differs from the present invention and Zubarev. Ding is distinct from the present invention and Zubarev in that electrons are not injected in the apparatus. That is, the problem concerning injecting electrons cannot arise in Ding.

Claim 1 of the present application uses a rectangular waveform as the trapping voltage. The ion trapping conditions are maintained while injecting electrons. In contrast, Zubarev decreases the peak-to-peak value of the trapping voltage in order to facilitate electron injection at the expense of worsening the condition for trapping ions. Thus the present invention differs from Zubarev in the basic technical idea.

The Office Action also cites Ding for disclosing switching a trapping voltage between two discrete DC voltage levels to create a digital trapping field for trapping precursor ions and product ions in a trapping region of the ion trap. (Office Action, page 4.)

Applicants respectfully submit that the present invention as recited in the claims would not have been obvious based on Zubarev and Ding because it would not have been obvious to one of ordinary skill in the art to combine Zubarev and Ding.

It would not have been obvious to combine the teachings of Zubarev and Ding because the invention described in Ding does not relate to ECD. And one of ordinary skill in the art would not combine Ding with Zubarev because Ding does not relate to the injection of electrons.

In the Advisory Action, the Office takes the position that it would have been obvious to combine Zubarev and Ding because they both teach 3D ion traps. (Advisory Action, continuation sheet.) However, as noted above, since Ding does not relate to ECD, it would not have been obvious to one of ordinary skill in the art to combine the switching function in Ding with the Zubarev.

Furthermore, even if Ding could be combined with Zubarev as alleged in the Office Action, the modified invention would be an invention in which the peak-to-peak value of the rectangular waveform is decreased while injecting electrons, rather than keeping constant as in the present invention.

Regarding the position of the Office in the Advisory Action that the claims do not require ECD, Applicants first note that the point about ECD in the previous response (Amendment, January 14, 2010), and as provided above, was made to emphasize that it would not have been obvious to combine Zubarev and Ding because Zubarev discloses ECD and Ding does not disclose ECD. Second, Applicants note that the claims actually do require ECD. For example,

Amendment under 37 C.F.R. §1.114
Attorney Docket No. 062924
Application No. 10/598,185

claim 1 recites “whereby injected electrons reach the trapping region with a kinetic energy suitable for electron induced dissociation to take place.”

Regarding claim 9, the Office Action takes the position that the introduction of the electron beam through a hole in the ring electrode is an arrangement that is well known in the art and is merely a rearrangement of parts and a substitution of one known element for another that would have yielded predictable results. (Office Action, page 3.) However, Applicants note that a slit for injecting ions (as recited in claim 9) allows for an electron source to be in an elongated shape, such as a long filament. This means that large-sized electron sources can be used, resulting in more electrons to be injected.

In view of the above remarks, Applicants submit that the claims are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants’ undersigned attorney to arrange for an interview to expedite the disposition of this case.

Amendment under 37 C.F.R. §1.114
Attorney Docket No. 062924
Application No. 10/598,185

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,
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